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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/043,739	01/09/2002	Masayoshi Nakagawa	9281-4241	6542

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Brinks Hofer Gilson & Lione
P.O. Box 10395
Chicago, IL 60610

EXAMINER
DOLAN, JENNIFER M

ART UNIT	PAPER NUMBER
2652	

DATE MAILED: 04/24/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/043,739	NAKAGAWA ET AL.	
	Examiner	Art Unit	
	Jennifer M. Dolan	2652	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-14 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-14 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 3 .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in-
> (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or
> (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

2. Claims 1, 2, 7 – 9, and 14 are rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent Publication No. 2001/0004303 A1 to Wada et al.

Regarding claim 1, Wada discloses a magnetic head actuator having a finely movable tracking device (paragraph 0033, lines 1-5). The actuator comprises a swing arm (course actuator in paragraph 0034) having a magnetic head (12a) at a free end and reciprocally movable around a coarse rotation axis at a base of the swing arm (paragraph 0034, lines 1-3). The actuator further comprises a piezoelectric element (11) mounted in the swing arm (figures 1 and 4), the piezoelectric element having a voltage-impressing electrode (paragraph 0053, lines 3-9) for allowing a fine arcuate movement of the free end around the course rotation axis in response to an applied voltage (paragraph 0055, lines 6-25 and paragraph 0056, lines 1-6). Wada further discloses an FPC board (18a, 18b, 18c) having a resin base and a feeding line (end of 18b and 22) embedded in the resin base (paragraph 0042, lines 9 – 14) for feeding power to the voltage impressing electrode (paragraph 0043, lines 4-7), wherein a portion of the resin base is removed

to expose a portion of the feeding line that extends onto the electrode (paragraph 0042, lines 14-18). Wada further teaches an electrical connection between the feeding line and the voltage impressing electrode at the exposed portion of the feeding line (figure 2 and paragraph 0047, lines 1-5).

Regarding claim 8, the swing arm, piezoelectric element, and FPC board claimed are identical to the corresponding components in claim 1. Thus, Wada discloses a swing arm, piezoelectric element, and FPC board, as explained supra. Wada further discloses that the feeding line (18b) resides completely within the FPC board (18) except for an exposed portion (22 and part of 18(b) touching 22) extending onto the voltage-impressing electrode (11 top). The connection between the feeding line (22 and end of 18b) and the piezoelectric element (11) is direct (figure 2).

Regarding claims 7 and 14, Wada discloses a trace line (18a) leading to the magnetic head (figure 2). The trace line extends, together with the feeding line (18b) in the FPC board (figure 2).

Regarding claims 2 and 9:

As the claims are directed to a magnetic head actuator, per se, the method limitations appearing in claims 2 and 9 have only been accorded weight to the extent that they affect the structure of the completed magnetic head actuator. Note that "determination of patentability in 'product-by-process' claims is based on product itself, even though such claims are limited and defined by process i.e., "ultrasonic bonding", and thus product in such claim is unpatentable if it is the same as, or obvious form, product of prior art, even if prior product was made by a different process", *In re Thorpe, et al.*, 227 USPQ 964 (CAFC 1985). Furthermore, note that a

"product-by-process claim, although reciting subject matter of claim in terms of how it is made, i.e., "ultrasonic bonding" is still a product claim; it is patentability of the product claimed and not recited process steps that must be established, in spite of fact that claim may recite only process limitations", *In re Hirao and Sato*, 190 USPQ 685 (CCPA 1976).

Regarding claims 2 and 9, Wada discloses an electrical connection (figure 2 and paragraph 0047, lines 1-5). The method limitation of "ultrasonic bonding" is not given patentable weight.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 3 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wada et al.

Regarding claims 3 and 10, Wada discloses that the electrical connection between the magnetic head slider and the FPC feeding line comprises an Au ball bond (paragraph 0044, lines 1 – 7). Wada does not specify the means by which the piezoelectric element electrodes are connected to the FPC trace lines. The electrical connection between the FPC and the piezoelectric element is considered to comprise Au ball bonds. Assuming arguendo, the elements are connected by a means other than Au ball bonding.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to specify that the connection between the FPC feeding line and the piezoelectric element electrode of Wada comprises an Au ball bond. The rationale is as follows: One of ordinary skill in the art at the time the invention was made would have been motivated to provide an Au ball bond, because Wada teaches that Au ball bonding provides adequate electrical connections between magnetic head elements and FPC lines (paragraph 0044).

5. Claims 6 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wada et al. in view of U.S. Patent No. 6,233,124 to Budde et al.

Wada fails to disclose a pair of piezoelectric elements having polarities opposite to each other.

Budde discloses a pair of piezoelectric elements having opposite polarities (column 4, lines 24 – 27).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the piezoelectric structure of Wada such that it comprises a pair of piezoelectric elements having opposite polarities, as taught by Budde. The rationale is as follows: One of ordinary skill in the art at the time the invention was made would have been motivated to provide a pair of piezoelectric elements with opposite polarities so that with the application of a voltage, one element will expand while the other element contracts (Budde, column 4, lines 25 – 36), generating a larger amount of torque in the head suspension for the same voltage when compared with a pair of electrodes with the same polarities.

6. Claims 4, 5, 11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wada et al. in view of U.S. Patent No. 5,815,347 to Pattanaik.

Regarding claims 4 and 11, Wada discloses that the electrical connection between FPC feeding lines and magnetic head element electrodes is made using a gold ball (paragraph 0044, lines 1 – 7).

Wada fails to disclose a through-hole in the exposed portion of the feeding line, wherein the electrical connection is made using a gold ball is positioned in the through-hole.

Pattanaik discloses a through-hole (8) in a bonding section of flex cable (9, column 7, lines 30 – 40; figures 7 and 8b), wherein the electrical connection between the flex cable traces and the termination pads (5) of a magnetic head element is made using a conductive ball positioned in the through-hole (column 8, lines 21 – 27).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the magnetic head actuator of Wada such that a through hole is provided in the feeding line, wherein the electrical connection is made using a conductor positioned in a through hole, as taught by Pattanaik. The rationale is as follows: One of ordinary skill in the art at the time the invention was made would have been motivated to provide a through hole in the feeding line, with a ball connection in the through hole, because a connection of this type form a very solid electrical and mechanical connection (Pattanaik, column 9, lines 15 – 22), simplify the manufacturing process of the suspension, and have relaxed alignment requirements (column 9, lines 8 – 10).

Regarding claims 5 and 12, Wada discloses an electrical connection between the exposed portion of the feeding line and the voltage impressing electrode, as explained supra.

Wada fails to disclose a stud bump made of conductive material residing on the piezoelectric element and a through-hole located in the exposed portion of the feeding line.

Pattanaik discloses a stud bump (4) made of conductive material (column 8, line 17) residing on an electrode of a magnetic head element (column 8, lines 21-22) and a through hole (8) located in a connection portion of the flex cable (9), wherein the electrical connection is made by positioning the stud bump in the through hole (column 8, lines 14 – 27).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the magnetic head actuator of Wada such that it includes a stud bump on the piezoelectric element electrode and a through hole in the FPC, as taught by Pattanaik. The rationale is as follows: One of ordinary skill in the art at the time the invention was made would have been motivated to provide an electrical connection comprising a stud bump placed in a through hole, because such a connection results in a very solid electrical and mechanical connection (Pattanaik, column 9, lines 15 – 22).

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

U.S. Patent No. 5,929,326 to Imaino et al. discloses several methods for bonding conductor traces to a piezoelectric element.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer M. Dolan whose telephone number is (703) 305-3233. The examiner can normally be reached on Monday-Friday 8:30am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hoa T. Nguyen can be reached on (703) 305-9687. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9314 for regular communications and same for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-3900.

Jennifer M. Dolan
Examiner
Art Unit 2652

jmd
April 15, 2002

HOA T. NGUYEN 4/22/02
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600